

MECHANICAL ENGINEERING STUDENT SEMINAR

Monday, May 30, 2024 at 13:00,

Online: <https://technion.zoom.us/j/96891231283>

Dynamics and jump-off force of droplets

impacting on solid substrates

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Novel findings on the role of viscous effects and surface patterns emerging in droplet dynamics following an impact on superhydrophobic surfaces will be presented. Recent studies in literature reported that in addition to the first peak of force imparted by a droplet impact on the superhydrophobic surface, a second force peak is directly related to a droplet jump-off, which scales with the inertia-dominated force. The talk will also discuss a more complex relationship that accounts also for liquid viscosity and surface patterns.

Numerous series of experiments are conducted, and a novel model for evaluation of the jump-off force accounting for various liquid viscosities based on the observations of the flow-focusing process is developed. This model provides a robust foundation for understanding droplet dynamics following the impact in viscous regimes. Furthermore, experimental investigation of droplet impact on macro-ridge-decorated superhydrophobic mesh surfaces reveals that the presence of the ridge significantly affects droplet patterns and hinders the liquid penetration through the mesh. A modified flow-focusing model is developed to explain this phenomenon, which arises from the departure from the symmetry of flow focusing and subsequent fragmentation of the jump-off force. This distributed weakening of the total jump-off force leads to the change in the condition for liquid penetration with respect to the case of a flat mesh surface.

Note: the seminar will be given in English

Seminars Coordinator: Assoc. Prof. Shmuel Gal.